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CAREER OF ACADEMICIAN B.A. VVEDENSKIY, USSR RADIO ENGINEER

[Comment: The following is the full text of an article which appeared in Vestnik Akademii Nauk SSSR, No 5, 1953.]

A well-attended meeting convened in the conference hall of the Department of Technical Sciences of the Academy of Sciences USSR to mark the 60th birthday and 40 years of scientific and pedagogic work of Academician Boris Alekseyevich Vvedenskiy, the eminent radio engineer and radio physicist.

In a short introductory speech, Academician A.N. Nesmeyanov, President of the Academy of Sciences USSR, outlined the scientific and organizational work of Vvedenskiy.

The president remarked on the great scientific organizational work which Vvedenskiy has carried out. Vvedenskiy is a member of the Presidium of the Academy of Sciences USSR, Director of the Section for the Scientific Development of Radio Engineering Problems of the Department of Technical Sciences, and Editor in Chief of the Bol'shaya Sovetskaya Entsiklopediya (Great Soviet Encyclopedia).

The name of B.A. Vvedenskiy is widely known throughout the USSR and in other countries. The Soviet government has awarded him the Order of Lenin and a Stalin Prize for his efforts in the development of science and engineering. Also, he has been awarded the Gold Medal imeni A.S. Popov for his notable scientific work in the field of radio.

Nesmeyanov congratulated Vvedenskiy in the name of the Presidium of the Academy of Sciences USSR, and wished him further successes for the good of the USSR.

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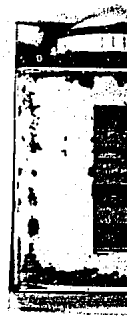

Next, Academician A.I. Berg spoke in praise of Vvedenskiy's activities. While still a student in the Physicomathematical Faculty of Moscow State University, Vvedenskiy carried out scientific work in the field of optics (on the diffraction of light) and then in the field of magnetism (1912). On completion of the university /course/ (1915), he entered the Moscow Military Field Telephone Plant, where he participated directly in developing methods of control of telephones. This practical work in industry greatly influenced the young scientist and researcher as a physicist, whose activity was thereafter indissolubly linked with engineering.

As Academician Nesmeyanow had already remarked, Vvedenskiy's first scientific works were carried out on magnetism and the theory of eddy currents. He founded a method of calculating eddy currents in ferromagnetics with "magnetic viscosity" (1925). With B.A. Shilliarov, he compiled tables which markedly simplified the calculations. These works still retain their practical and scientific value. He then compiled (together with G.S. Landsberg) the basic work Contemporary Teaching of Magnetism, which is unexcelled both in the USSR and abroad in regard to completeness of material. This work also still retains its scientific value.

Vvedenskiy next directed his scientific research to another problem, namely, the explanation of the effect produced in a vacuum-tube oscillator when parasitic oscillations arise. In 1926, Vvedenskiy published his book Physical Effects in Electron Tubes; this was the first book in the USSR to give physical explanations of the processes originating in an electron tube. The book has had four editions. In 1934, Vvedenskiy published a work, completing the cycle of research, on the frequency stabilization of vacuum-tube generators by systems with distributed constants.

Academician Berg gave a detailed account of research by which Vvedenskiy came to a series of fundamental results in the field of contemporary methods of calculation of ultrashort-wave communication lines. Even in the early 1930s, he foresaw the possibility of using ultrashort waves for radio communications.

The first experimental efforts for the determination of quantitative laws of ultrashort-wave propagation under different conditions were carried out by Vvedenskiy in 1928 with the participation of A.L. Aronberg and A.V. Astaf'yev. At this time, Vvedenskiy put forward a formula for the calculation of the field intensity of ultrashort waves with the transmitting and receiving antennas at comparatively low heights, the distance between them being such that one could, without great error, neglect the curvature of the earth. This formula, which was later called the "Quadratic," is used at present for calculations in ultrashort-wave line communications where the antennas are low. In foreign publications, this formula appeared as an original one only in 1933, i.e., 5 years later.

The next work of Vvedenskiy was concerned with the development of the theory of diffraction of radio waves close to the earth as applied to the ultrashort wave band. This preceded the publication of the monograph The Basic Theory of the Propagation of Radio Waves (1934), in which Vvedenskiy succeeded in calculating the diffraction of radio waves close to the earth by means of classical methods of electrodynamics, taking into account the finite conductivity of the earth. This monograph is still one of the basic handbooks in the theory of radio-wave propagation. Also in 1934, Vvedenskiy, together with A.G. Arenberg, published the monograph Propagation of Ultrashort Waves. Revised and republished in 1938, this is one of the first reliable handbooks on the propagation of ultrashort waves.

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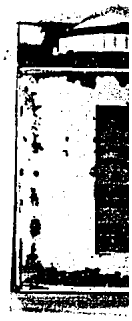

Vvedenskiy's work Diffraction Propagation of Radio Waves (1935), in which the finite conductivity of the earth is taken into account, greatly advanced the solution of the complicated mathematical problem of propagation of radio waves close to the spherical surface of the earth.

The speaker mentioned that certain eminent foreign mathematicians had tried to solve this problem in their time, but that all their experiments were unsuccessful.

In his research in the field, Vvedenskiy has used the asymptotic form of certain special functions and as a result had obtained the diffraction formula, which gives good agreement with experiments in the ultrashort-wave band (1935 - 1936). This new formula formed the foundation for calculation of the field of ultrashort waves beyond the horizon. In succeeding works, Vvedenskiy gave formulas, explained in detail the dependence of the field on the height of antenna arrays above the surface of the earth, and generalized the results obtained (1936 - 1941).

A special service of Vvedenskiy was the publication, in 1942, of special graphs for the calculation of the field of ultrashort waves beyond the horizon. The appearance of these graphs resulted in the use of Vvedenskiy's theoretical work in daily use in engineering practice.

As early as 1933, Vvedenskiy noted the effect of laminar nonhomogeneity of the troposphere on the propagation of ultrashort waves. Later, in two surveys (1941 and 1943), he gave a scientific basis to data already published in world literature on the effect of the troposphere on the propagation of ultrashort waves, and proved mistakes and shortcomings in the works of a number of foreign authors in this field. The earlier works of Vvedenskiy allowed him to draw conclusions about the connection between the propagation of ultrashort waves and meteorological conditions. Thus, radio engineering, together with meteorology, gave rise to a new field of learning -- radiometeorology.

In collaboration with M.I. Ponomarev, Vvedenskiy carried out detailed research on the application of geometrical optics. Apart from the graphical results, the criterion of applicability of the concept of "the earth's equivalent radius" is valuable in this research.

In 1946 appeared the monograph Radio Wave Guides, compiled by Vvedenskiy with A.G. Arenberg, which gave an exhaustive theoretical survey of a wide group of problems connected with wave guides and a description of specific experimental research

The book Problems of Ultrashort-Wave Propagation, published by Vvedenskiy and A.G. Arenberg, develops and completes earlier research. The book is an excellent textbook, accessible to a wide circle of specialists. It emphasizes the role of Soviet scientists in the development of ultrashort-wave propagation.

The speaker pointed out the activities of Vvedenskiy in monographs and scientific societies. Working in different scientific institutions, Vvedenskiy always gathers the young around him, drawing them into the circle of his scientific interests. Many of his pupils and co-workers are now independent scientific workers creatively developing Soviet radio engineering and radio physics.

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An ardent patriot, Vvedenskiy continually emphasizes and affirms the priority of Soviet science and popularizes the achievements of radio engineers and radio physicists. For example, he has written a series of articles against the infringement of foreigners on Russian priority of the invention of radio.

At the meeting, greetings were read from the Presidium of the Academy of Sciences USSR, the Department of Technical Sciences of the Academy of Sciences USSR, the Ministry of Communications USSR, the Ministry of Electric Power Stations and the Electrical Industry USSR, the Ministry of Culture USSR, the Bol'shaya Sovetskaya Entsiklopediya and a series of scientific research institutes, laboratories, higher educational institutions, and societies. In addition, about 100 congratulatory telegrams were sent by scientists, societies, and individuals.

/The last two paragraphs of the article consisted of quotations from Vvedenskiy's speech of thanks to the meeting./

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